

the stresses usually experienced by these bones. The results show definitely that the strains put upon the bones by the muscles are not necessary to the growth of the bones. Such unstressed bones grew as much as 56% to nearly 100% in four and one-half months. On the other hand bones unstressed by muscles were much smaller in diameter, in the thickness of compacta, in the size of the trabeculae; were reduced in weight and in their resistance to crushing. Growth in length seems little influenced.

#### EPITHELIAL MOVEMENTS IN VITRO

Shinichi Matsumoto (Jour. Exp. Zool. Vol. 26, Aug. 1918) reports experiments in the culture of corneal epithelium of adult frogs *in vitro*. This is a favorable material because the transparency of the cornea is such as to allow direct observation of the cell movements. Various substrata were used—as flat surfaces of glass, celloidin, and dead cornea; spider web, silk fiber, glass wool, asbestos fiber; and porous bodies, such as thin pieces of pith.

The movements are amoeboid, with the cells tending to cling to their own kind and thus to form sheets. This is a most essential quality in forming and extending epithelial surfaces. The author believes this to be thigmotactic rather than chemotactic in nature, extending as they do over various types of surfaces. Rapid extension of epithelium may thus take place with no mitotic divisions at all.

The same author (Jour. Exp. Zool. Oct. 1918) discusses the technic and results of vital staining of these corneal cells in neutral red. When this was done by immersing the whole animal in a weak solution (1:100,000 to 1,000,000) the excised cells behaved *in vitro* just about as the unstained cells do, and were more readily followed because of the distinctness of the granules in the cytoplasm.

The corneal epithelium, incidentally, showed clear phagocytosis of the pigment of broken iris cells and of finely powdered granules of various stains.

#### ENTOMOLOGICAL ABSTRACTS

*Physiology of Chironomus Larva.*—In a study of the biology and physiology of the larva of *Chironomus gregarius*, Pause (1918, Zool. Jahrb., Abt.f. all. Zool. u. Physiol., 36:339-452) finds, among other things, that this larva has four molts. Tracheae, absent in the first instar, appear in the second, and are confined to the head and thorax.